426-231

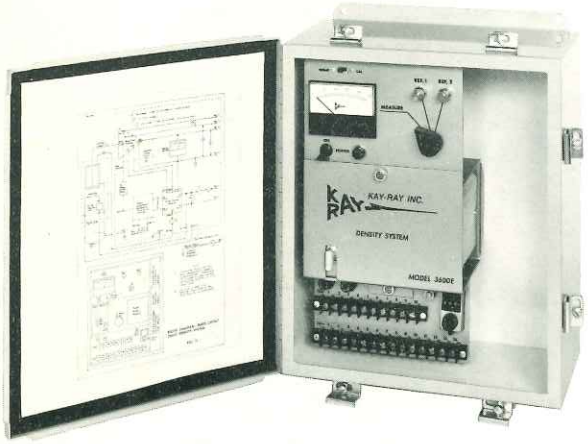
KAY-RAY INC.

INDUSTRIAL PROCESS CONTROL EQUIPMENT

EQUIPMENT DATA

GROUP 170
JUL 3 1975

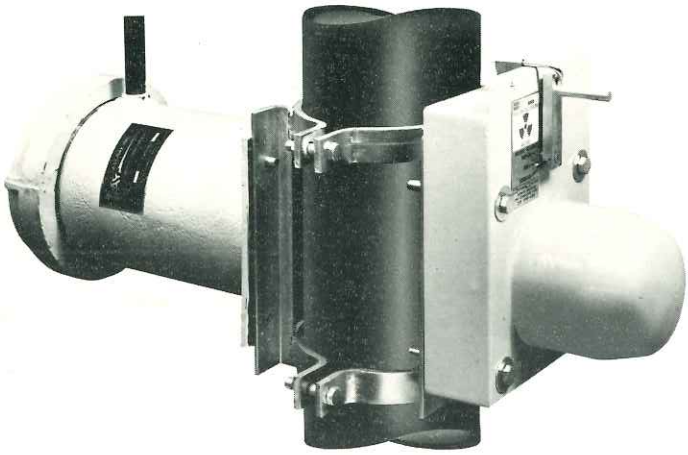
MAILED
JUL 3 1975
GROUP 170



KAY-RAY

DENSITY SYSTEMS

FOR • SOLUTIONS • SLURRIES • BULK PRODUCTS



MEASURE:

- Specific Gravity
- Percent Solids
- Concentration
- Bulk Density
- Pipeline Interface

FEATURES:

- Non Contacting Measurement
- Low System Cost
- In Plant Serviceability
- No Drift Electronics
- Permanent Calibration
- High Accuracy

HOW DENSITY IS MEASURED:

The percent solids in a slurry, the specific gravity of a solution, or any density related variable flowing through a pipe or container is measured automatically and continuously by using a radioactive source. The gamma rays produced by this source pass through the pipe walls and the measured material at a rate that is inversely related to its density. These rays are detected by a unique high efficiency ionization chamber. A visual readout is provided for process monitoring; an electrical output is provided for continuous process control. A two point referencing method is used to confirm calibration when required.

WHY A RADIATION GAUGE:

The gauge is designed for immediate integration into existing plant process streams without disrupting facilities or production. The source and detector are generally mounted externally to the pipe thus no part comes in contact with material being measured. As a result, measurement is not affected by product temperature, pressure, abrasiveness or corrosion.

The high degree of reliability and sensitivity makes this equipment ideal for tie-in to a process control system.

WHY A KAY-RAY GAUGE:

The Kay-Ray Gauge is the result of many years of experience in the design of density gauges for industry. KAY-RAY units offer such features as high efficiency, temperature controlled ionization chamber; shutter mechanism with built-in reference block; collimated beam; no electronics in measurement head; modular and solid state electronics.

APPLICABILITY: It is designed for process control, not as a millivolt sensor. The 0 to 10 volts, or current output can direct drive conventional low cost recorders or controllers without the use of expensive millivolt converters. The unit is also suitable for connection with computers.

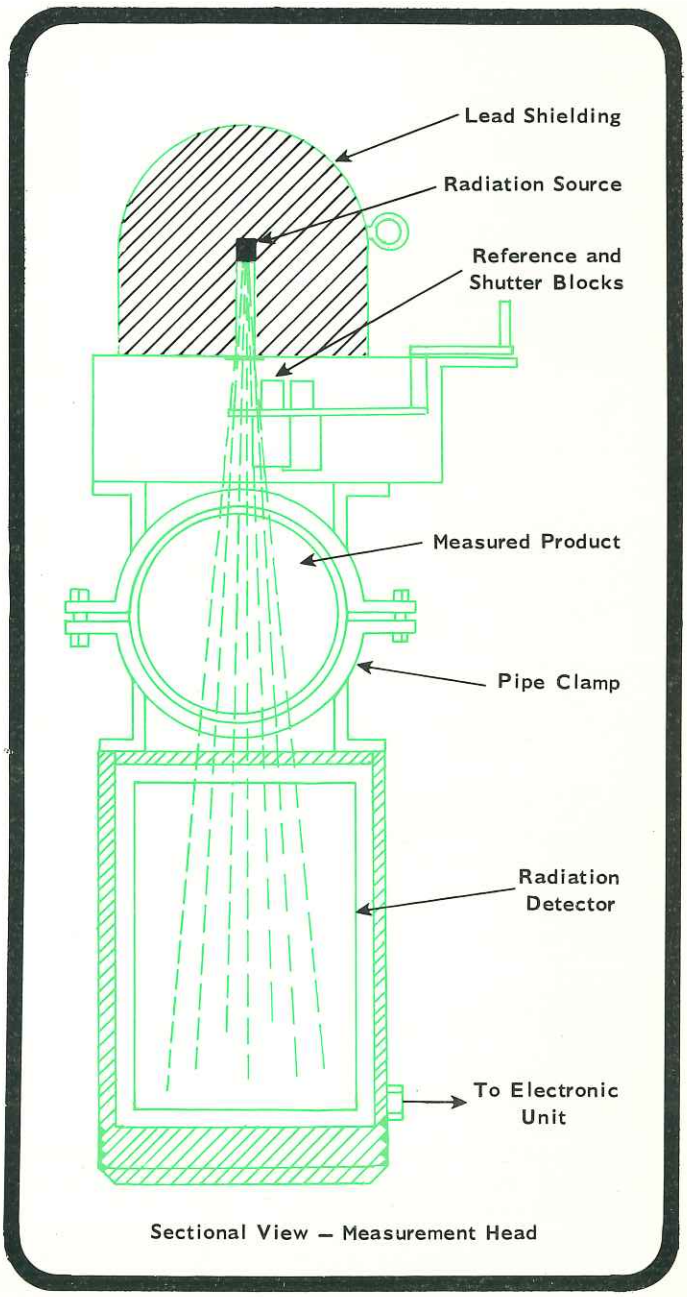
RELIABILITY: Solid state design in conventional thoroughly proven circuits increases the inherent reliability of the instrument. Every gauge is factory tested and aged to make certain that it meets the application requirements for trouble free operation in the field.

SERVICEABILITY: Because maintenance of electrometer circuitry requires unique skills, the Kay-Ray Gauge is built using plugin modules. Replacement does not affect calibration. By use of spare modules, maintenance can be performed by plant instrument personnel immediately on equipment failure without the delays and costs associated with bringing in a factory service engineer.

COST: Generally the justification in purchase of a density gauge is in closed loop control of a process. Here the cost advantage of Kay-Ray systems orientated design becomes substantial. On a price basis, the high performance Kay-Ray System can actually cost less than many competitive DC electrometer systems.

KAY-RAY INC.

INDUSTRIAL PROCESS CONTROL EQUIPMENT



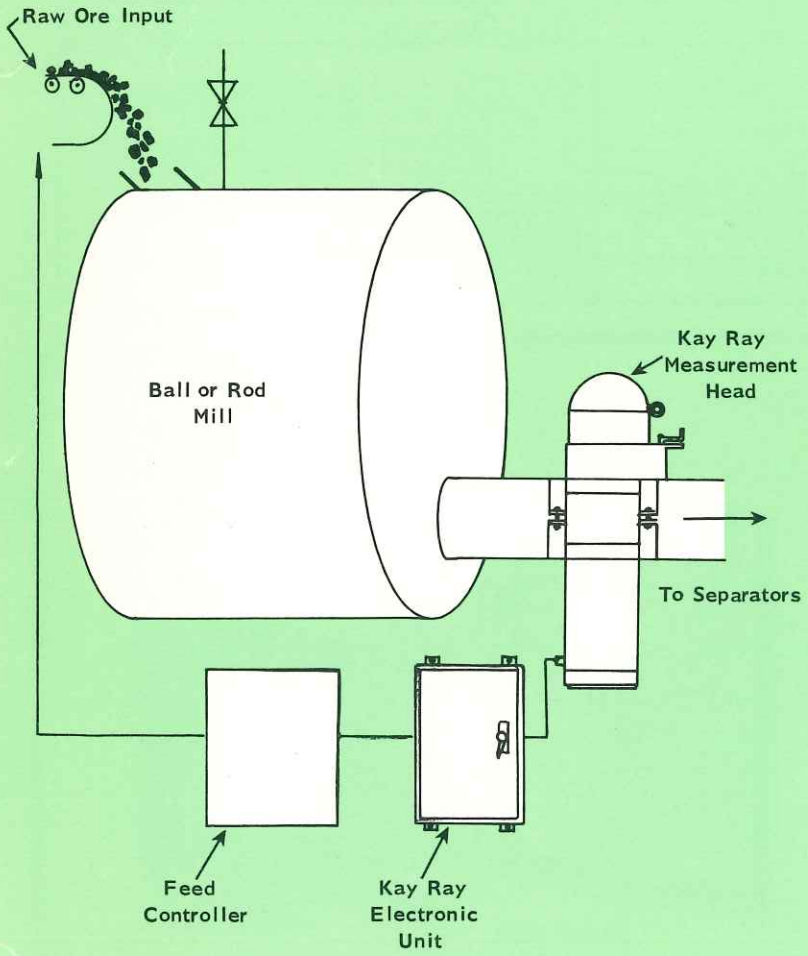
Sectional View – Measurement Head

HOW THE KAY-RAY DENSITY GAUGE IS APPLIED:

Success in applying the Kay-Ray Gauge starts by considering the process requirements in terms of location and accuracy, and proceeds through installation, calibration, and operation.

TYPICAL KAY-RAY DENSITY SYSTEM IN A TACONITE GRINDING CIRCUIT:

To maintain maximum efficiency in an ore grinding process, the solids content of the slurry in the ball or rod mill should remain constant. The Kay-Ray System measures the solids content of the slurry at the exit of the mill and adjusts the input of new or oversize ore to maintain a constant solid content.



ACCURACY:

Accuracy is related to gauge parameters such as detector current, instrument response time, and amplifier stability, and such process parameters as pipe size and specific gravity. By optimizing conditions an accuracy approaching .0001 specific gravity units can be attained. Under normal plant conditions, .0005 to .001 can usually be obtained without difficulty.

INSTALLATION:

The measurement head is bolted to an existing line without interruption of the process. A single 3/4 inch conduit connects between the head and the electronic unit. Separation of up to 1000 feet is permissible. The electronics are enclosed in a dust moisture tight enclosure for surface mounting in any convenient plant or instrument area.

CALIBRATION:

For accurate readout, the instrument must be calibrated 'on stream' using conventional laboratory methods of density analysis from samples withdrawn from the line. Calibration once established is permanent and will not change with time.

OPERATION:

Use of the Kay-Ray Gauge does not require operator attention. A visual readout is provided for process monitoring; an electrical output is provided for continuous process control. Operation of the equipment can be confirmed at any time by following a simple referencing procedure. Both ends of the instrument scale are checked to assure absolute conformance to instrument calibration. The use of a high performance amplifier eliminates the need for daily or short term corrections for zero drift. Referencing once a month is adequate in most applications to correct for long term equipment or source changes.

OTHER APPLICATIONS

Sewage Sludge
Pipeline Interface
Thickener Underflow
Cement Slurry
Acid Concentration
Ore Concentrate Pulp Density
Paper Coating
Starch Solutions
Lime Mud
Distillation Process
Dredging Solids Control
Acid Makeup
Multi-phase Blending
Evaporator Cooking
Crushed Coal Bulk Density
Vegetable Oil Aeration
White Liquor
Heavy Media Separation
Solids Transportation in Pipelines
Polymerization Control
Foam Control
Waste Water Control
Mass Flow Control
Extraction Control

OUR RESPONSIBILITY TO YOU:

Kay-Ray provides years of experience in the design and application of nuclear gauging equipment to industry. The wide acceptance of Kay-Ray gauges throughout industry is a measure of our success. We believe it is a direct result of marketing our product not as hardware but as a system. Our responsibility does not cease with supplying a reliable functional gauge. This merely is a necessary starting point. It continues on through complete satisfaction with the installation and performance of the system in the application. This is perhaps best exemplified in the wording of our "Performance Guarantee."

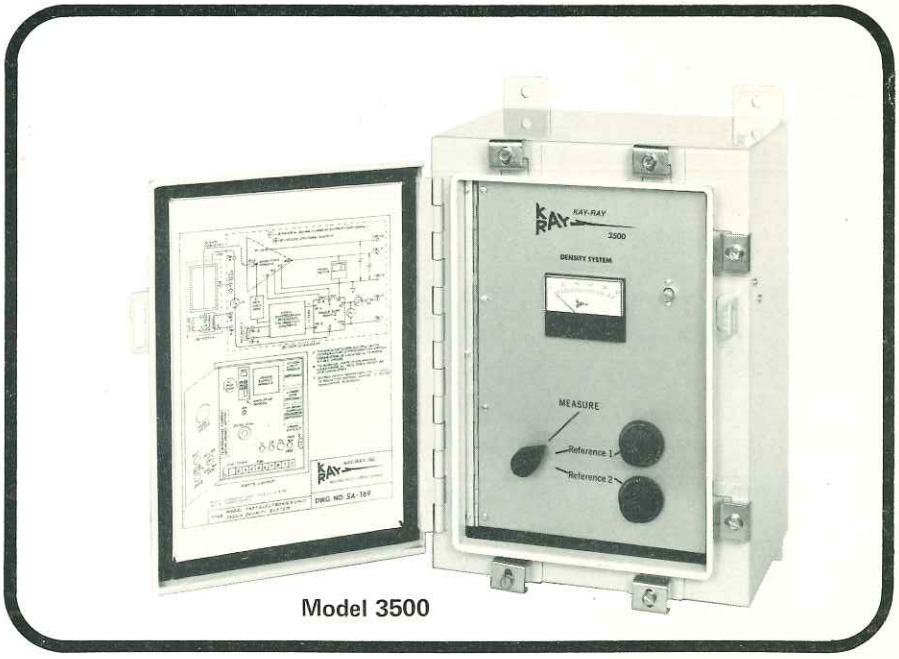
IF

Your interest indicates a present or future need to resolve density or moisture related problems, Kay-Ray local or factory assistance is as available as your phone. Please call or write today.

Our conviction, based on many years experience in the industrial gauging field, allows Kay-Ray to guarantee performance of their equipment in your application. For us to provide this assurance, it is necessary when purchasing the equipment, that the application be completely described on our Application Data Form for our quotation on a guaranteed performance basis. This means that if the Kay-Ray equipment does not perform according to our quotation, we will accept its return for full credit within the prespecified period subject to our field inspection.

General Specifications: Specifications vary between Kay-Ray 3500 and 3600 Density Systems and are available upon request.

System	Accuracy	Up to .0001 SGU
	Range	Not Limited
	Span	Minimum .02 SGU
	Process Temperature	Unlimited
	Pipe Size	1" to 36"
	Mounting	Clamp on
	Paint	Epoxy
Electronics	Type	Solid State
	Enclosure	NEMA 12 or 4
	Readout	Panel Meter
	Construction	Modular
	Amplifier	Varactor Bridge — Chopper Stabilized
	Drift	Less than .2 mv/mo. non-accumulative
	Temperature	0 to 120° F
	Output Standard	0-10 VDC for range
	Output Optional	1-5, 4-20, 10-50 ma, 3 to 15 psi for range
	Power	115 V ± 10% 50-60 cps 0.25 amp
	Response Time	Variable from sec. to min.
	Weight	Approximately 50 lbs.
	Size	Approximately 12" x 15" x 6"
	Options	Process Temperature Compensation Signal Linearizer Alarm, Hi-Lo Source Decay Compensator
Detector	Type	Ion Chamber
	Housing	Designed to meet Class 1, Group D, Div. 1
	Temperature	-20 to 140° F.
	Size	10" D x 16"
	Weight	Approximately 80 lbs.
Source Holder	Construction	Welded Steel
	Shutter	Three-position — open, closed, (lockable), reference
	Radiation Level	A family of heads available to meet any licensing requirements.
	Source Type	Cesium 137, Cobalt 60
	Source Strength	Variable to application
	Radiation Beam	Collimated
	Weight	Varies by type
	Size	Varies by type
	Options	Pneumatic operated shutter, Position indicator switch



Model 3500

KAY-RAY INC.
INDUSTRIAL PROCESS CONTROL EQUIPMENT
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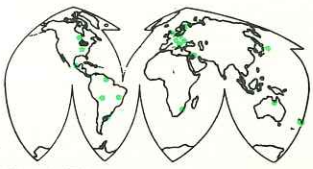
WORLD WIDE SALES AND SERVICE



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